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## Dakota Sandstone as a Basinal Basidium

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## REGENCY OF ORIGIN OF UPPER DES MOINES RIVER

CHARLES R. KEYES

Of all of Iowa's drainage features a seemingly unique phase is the gorge of the upper Des Moines River, on that stretch of stream above the Capital City. As is well known, this part of the Valley is a deep, V-shaped gorge gashed in the upland prairie, a canyon, in fact, with short lateral canyons instead of the normally long, widely dendritic tributaries. This gorge has bed-rock walls and bed-rock bottom, attesting its extreme recency of formation. In these respects it contrasts strongly with the valley of the lower Des Moines River, between Des Moines city and the mouth of the stream at Keokuk, which is a wide, flat-bottomed trench, with old bed-rock channel 150 feet below the level of the present flood-plain.

The gorge of the upper stretch of the Des Moines River is a brand new drainage-line. It is seemingly one expression of the last glaciation, when the Des Moines lobe of the Ashawa ice-sheet was in retreat, with the new river determined by supra-glacier drainage, and the concentration of that drainage towards a single median trench, which soon reached down to the bed-rock surface where it had never before been sculptured by stream. If this interpretation be correct, a new type of river genesis is presented.

DES MOINES, IOWA.

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## DAKOTA SANDSTONE AS A BASINAL BASILIUM

CHARLES R. KEYES

Meek and Hayden's type-section of the Cretaceous Dakota sandstone is directly across the Missouri River from Sergeant Bluff, below Sioux City. Neither this outcrop, nor the fine exposure at Sergeant Bluff, which latter is commonly considered as Iowa's best section of the formation, are complete to top or to bottom. Drill-core records have shown the Dakota sandstone to extend nearly 200 feet below the base of the exposed section named; and erosion has removed perhaps as many more feet from the top.

The Iowa section, therefore, does not indicate the real stratigraphic significance of the Dakota beds, for, from outcrops elsewhere, it is known to be a true basal sandstone. Neither do the Iowa sections give any suggestion of the Dakota's broader stratigraphic relationships, since, singularly, this sandstone appears to extend unbrokenly from Iowa to Nevada, and from Mexico to Canada. Throughout its range it constitutes the basal lining of the broad Cordilleran, or Rocky Mountain, geosyncline, with three miles of stratigraphic interval between its deepest occurrence and its highest elevation as an old strand-line. It is not, in fact, a really good geological formation, in the commonly accepted meaning of that term, inasmuch as it is of different geological ages at different places. For such a basal sandstone the title *Basilium* is suggested, the diminutive of base, in contradistinction of the great basement complex beneath all.

DES MOINES, IOWA.

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## ORIGINAL GREAT MAGNITUDE OF OUR COAL MEASURES

CHARLES R. KEYES

Recent diastatic analyses of our Des Moines coal measures, particularly of the great Arkansan centrum, or delta, of which the Iowa coal measures are a part, after the paradigm of the Cordilleran Cretacic geosyncline, indicate that only a relatively small proportion of the original deposition of coal-bearing beds now remain to us. Present thickness of the Iowa coal measures is perhaps 300 to 400 feet. In the beginning, the volume appears to have been more than four miles thick. The vast missing bulk was removed through erosion, mainly regional planation before the great Missourian series of limestones was laid down.

The Des Moines series itself thus becomes an exact cyclic counter-part of its Cretacic analogue. There is the same broad down-sinking of the initial, or basal peneplane, to serve as a quantitative directrix in measurement of the magnitude of the geosynclinal depression and the extent of the diastrophic movements; there is the same prodigious infilling of the geosynclinal trough by fine sediments, with accompanying shore accumulations of vegetation, later to form coals, until, as said, the coal measures attained